

period.¹⁴ Similar micrographs appeared in a paper that was part of the doctoral dissertation of one of his students, Johannes Rhodin (Sjöstrand & Rhodin, 1953). One of these micrographs is reproduced in Figure 6.2. Sjöstrand and Rhodin proclaimed,

This investigation has demonstrated an internal structure within the mitochondria, which, as far as we know has not been described before. The system of transversally orientated double membranes and the clear cut demonstration of a similar outer membrane around the mitochondria indicate a high degree of organization of these cell organelles. (p. 449)

He described the structure more fully in his paper with another student, Viggo Hanzon (Sjöstrand & Hanzon, 1954):

In the interior of the mitochondria densely packed inner membranes or plates are seen mainly oriented perpendicularly to the long axis of the mitochondrion. The inner membranes also appear double edged. One end of the membranes is in contact with the outer surface membrane and the other end in most cases is free from this membrane. (p. 406)

Although acknowledging occasional contact, Sjöstrand went on to state, “There is with few exceptions no continuity observed between the central space in the inner and outer membranes” (p. 406).

Sjöstrand’s interpretation of what his micrographs revealed about mitochondria differed with Palade’s views on two major points.¹⁵ First, he maintained that the mitochondrial membrane was comprised of two layers, not one. Second, he rejected Palade’s claim that the cristae were infoldings of the mitochondrial membrane: “There are no indications that the inner membranes represent folds of a single edged surface membrane. The inner membranes are

¹⁴ Sjöstrand’s presentations at these meetings were a major boost to his reputation. His former mentor Schmitt, who had previously been cautious in his appraisals of Sjöstrand, commented, “We have been mildly skeptical of his claims that he can section to 200–500 Å consistently. This skepticism was completely removed at the Cleveland meetings of the Electron Microscope Society of America earlier this month. At these meetings he described his results on the pancreas cells, the convoluted tubule cells of the kidney, the retinal rods and cones, and the nerve myelin sheath. Any of these papers would have been a great credit to the most experienced authorities in the field. However, the combination of the four was easily the best work reported at the meetings – a real triumph for Sjöstrand.” (Letter of 25 November 1952 to Ture Petré, Head of the Anatomy Institute in which Sjöstrand’s laboratory was housed, Folder 1952–6, Box Karolinska Institutet, Molecular Biology, Series 800D, RG 2, Rockefeller Foundation Archives, RAC.)

¹⁵ Rasmussen (1995; 1997) offered a detailed account of the dispute between Palade and Sjöstrand in which he argued that differences in their interpretive styles, including how they related electron microscopy to biochemistry, were more important than differences in technique: “The structure of nature and the structure of the sciences were at stake simultaneously in the struggle over which interpretive method should be made standard, which practices ‘proper’” (p. 151).